CSc 174 Database Management Systems

1. Introduction to Database Management Systems

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Database Management Systems

- Database
  - A database is a collection of related data
- Database management System (DBMS)
  - A database management system is a collection of programs that enables users to create and maintain a database

Database Users

- Database Administrators (DBA)
  - Manage database and related software.

    e.g. Monitor use of resource, authorized access to the database, and system performance
- Database Designers
  - Design the structure to represent and store data
  - Identify the data to be stored
- End Users
  - Causal end user: use sophisticated database query language
  - Naïve user: menu-driven interface
  - Sophisticated end users: familiar with DMBS to implement their applications.

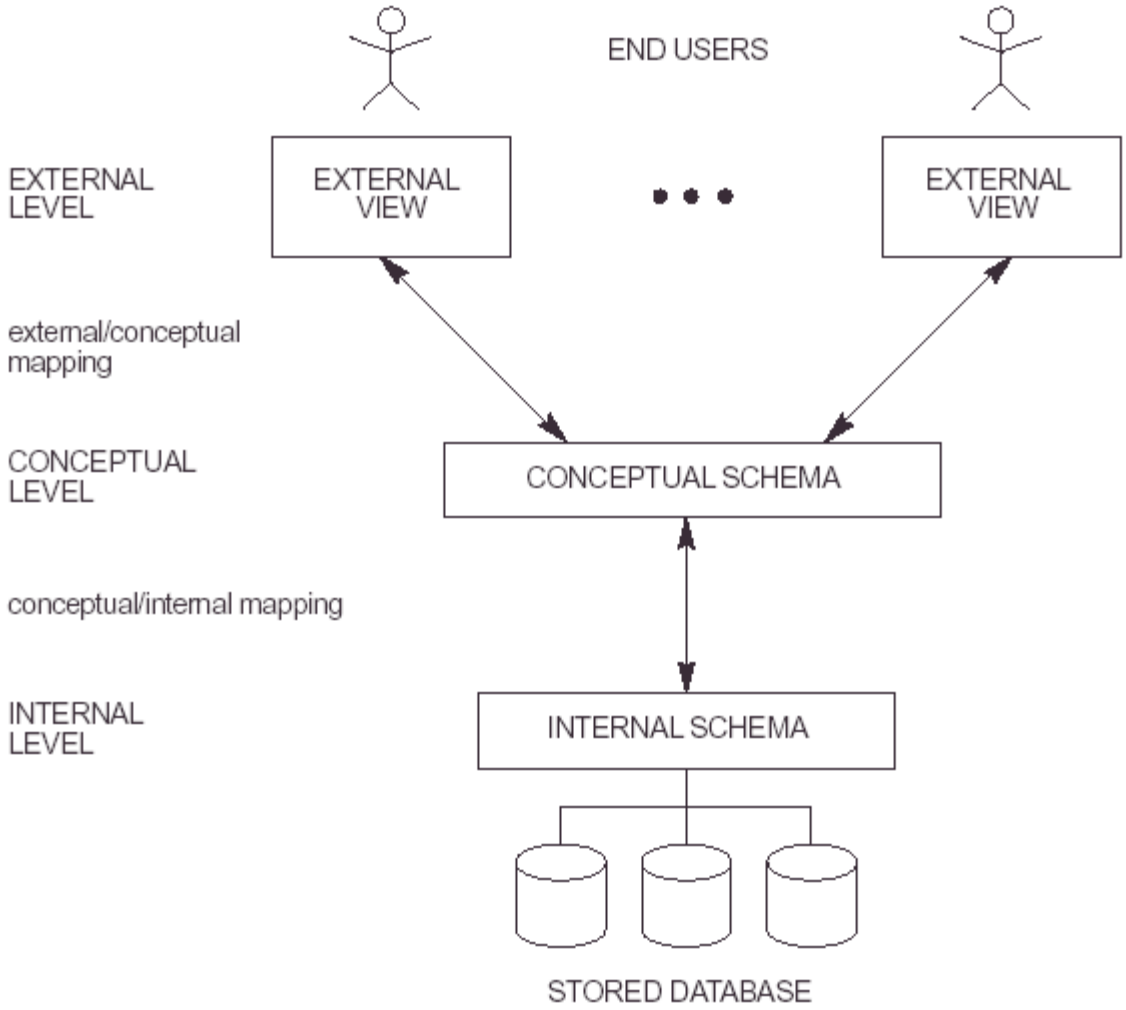
Data Models

Data Model: A collection of concepts to describe the structure of a database.

- High-level / conceptual model
  - Entity-Relationship model
- Representational /implementation model
  - Relational data model
  - Object data model
  - Network model
  - Hierarchical model
- Low-level / physical data model

  How data is stored in the computer

DBMS Architecture and Data Independency



Database Languages

- Data Definition Language (DDL)
  - Use to specify database schema
- Data Manipulation Language (DML)
  - Manipulate and access data (e.g. Insert, retrieve, delete, update)
- Query Language
  - Part of DML to specify how to retrieve data from the database
- Comprehensive Integrated language
  - e.g. SQL

Three-Tier client/Server Architecture for Web Application

- Client
  - GUI, Web interface
- Application Server
  - Application programs, web pages
  - Store procedures and constraints to access data from Database Server
  - Check client's credentials
  - Process and filter data
- Database Server
  - Database Management System

Classification of DBMS (1)

- Data Model
  - Relational, object-oriented, hierarchical, network model
- Number of Users
  - Single-user (one user at a time)
  - Multiuser system
- General purpose vs. special purpose
  - Online transaction processing (OLTP) for a large number of concurrent transaction

Classification of DBMS (2)

- Number of Sites
  - Centralized (data is stored at a single computer site)
  - Distributed (DDBMS)
    - Homogeneous DDBMS (same DBMS at multiple sites)
    - Heterogeneous DBMS
    - Federated DBMS or multidatabase system (DBMSs are loosely coupled and have a degree of local autonomy).

- These slides are based on the textbook:

R. Elmasri and S. Navathe, "Fundamentals of Database Systems," Addison Wesley, 7th edition.